NPL
National Physical Laboratory

EURADOS IC2017n

Irradiations at NPL

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NPL National Physical Laboratory

Outline

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- Irradiation Set-up
- Record-Keeping
- Summary of Uncertainties

NPL
National Physical Laboratory

Nuclear Metrology Group
Neutron Facility

Chadwick Building

Low Scatter Facility

24mx18mx18m

Source 6 m above the floor and 12 m below the cieling

Irradiation Overview

Source emission rates measured in NPL Manganese Bath

Source anisotropy measured in same facility as exposures

Source Type	Angle (degrees)	Dose ($H_p(10)$) (mSv)	Source ID	Emission Rate Aug 1st 2017 (s^{-1})	Source Anisotropy	Approximate Irradiation Length
^{241}Am-Be	0°	1.5	1999NE	3.1×10^7	1.041	2 h 11 min
^{252}Cf	0°	12	1254NU	8.5×10^7	1.023	6 h 54 min
^{252}Cf	0°	1.5	1254NU	8.5×10^7	1.023	52 min
^{252}Cf	0°	0.3	1254NU	8.5×10^7	1.023	10 min
^{252}Cf	45°	1.5	1254NU	8.5×10^7	1.023	53 min

All irradiations were performed at a distance of 75 cm

Irradiation Set-up

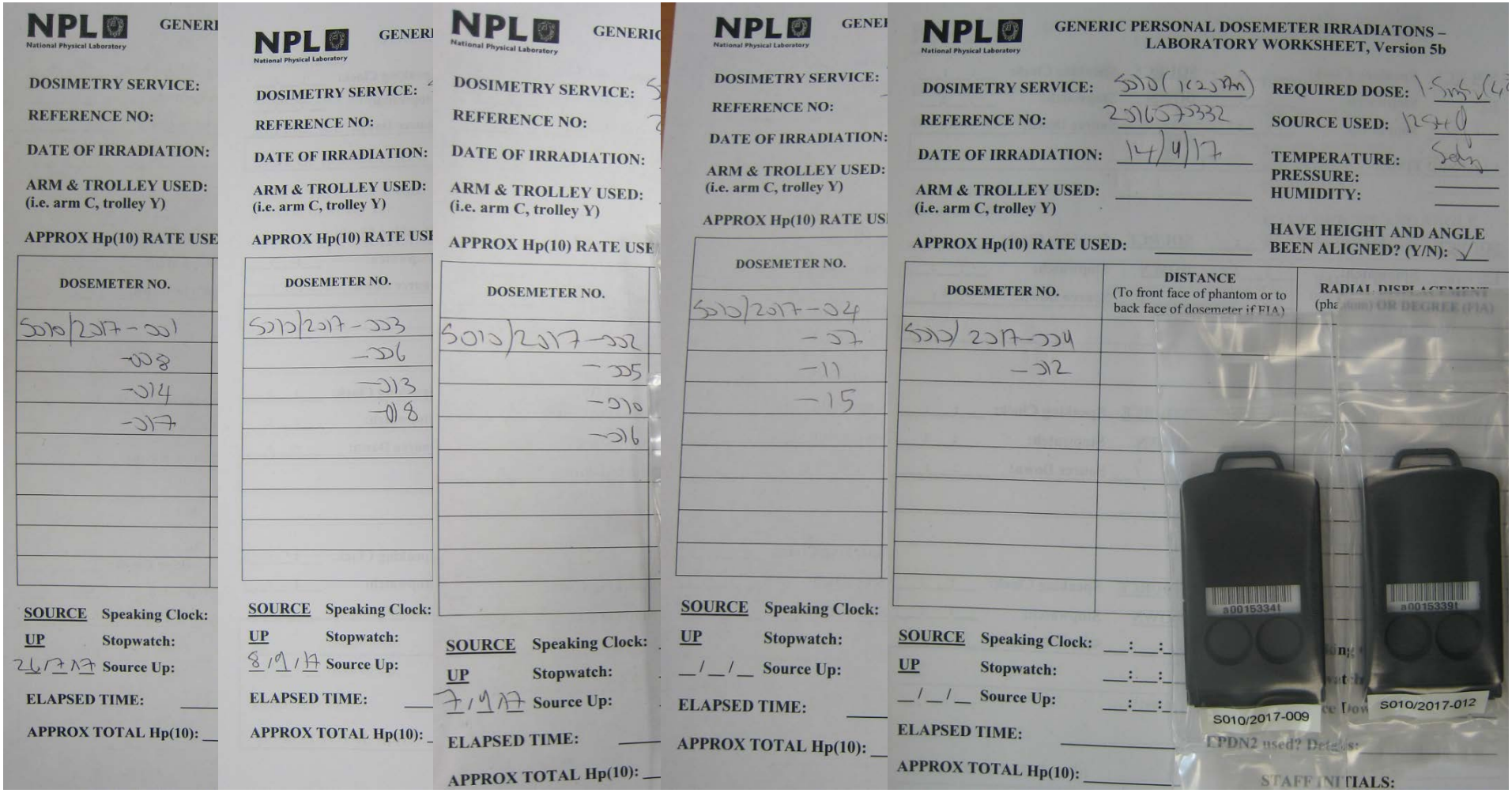
EPDs mounted on top of phantoms during exposures were used to monitor the irradiations

18 dosemeters for each participant

Total of 648 dosemeters were irradiated (9 August – 15 September 2017)

Record-Keeping

Photographs of dosemeters were taken with their respective record sheets to minimise transcription errors, and provide unambiguous evidence of the dosemeter exposures



Summary of Uncertainties

Uncertainty component	Irradiation				
	^{241}Am-Be 0° 1.5 mSv	^{252}Cf, 0° 12 mSv	^{252}Cf 0° 1.5 mSv	^{252}Cf 0° 0.3 mSv	^{252}Cf 45° 1.5 mSv
Type B (non-random)					
Reference irradiation distance	± 0.55%	± 0.55%	± 0.55%	± 0.55%	± 0.55%
Source emission rate ($MnSO_4$ bath) (includes component for half-life)	± 0.69%	± 0.53%	± 0.53%	± 0.53%	± 0.53%
Source anisotropy correction	± 0.25%	± 0.26%	± 0.26%	± 0.26%	± 0.26%
Timing	± 0.06%	± 0.02%	± 0.15%	± 0.74%	± 0.14%
Scatter	± 2.0%	± 2.0%	± 2.0%	± 2.0%	± 2.0%
$H_p(10,\theta)$ conversion coefficient	± 4.0%	± 1.0%	± 1.0%	± 1.0%	± 1.0%
Total Standard Uncertainty Components added in quadrature	± 4.6%	± 2.4%	± 2.4%	± 2.5%	± 2.4%
Expanded uncertainty	± 9.1%	± 4.8%	± 4.8%	± 5.0%	± 4.8%